

# A Study on Garments Dyeing with Direct Dyes and Pigments in Bangladesh

**Tanushree Saha, Rasheda Begum Dina**

Department of Wet Process Engineering, Bangladesh University of Textiles, Tejgaon, Dhaka-1208, Bangladesh.  
Corresponding author e-mail: tanu.textile@yahoo.com

**Abstract:** Garment dyeing has been practiced for many years, both commercially and as a home procedure. Recently, interest in this technique has increased since it makes possible to give rapidest response to consumer demand, reduces lead times and inventory. To establish a profitable garment dyeing plant, all manufacturing steps must be carefully controlled. In this paper, we have tried to give an idea about the process of using different types of dyes in garments dyeing and their fastness properties.

**Keywords:** Garments dyeing, fashion garments, Bangladeshi garments, garments styling.

## I. Introduction

Dyeing is the process of coloration of materials with colorants (dyes and pigments). This aesthetic operation can be done with almost all the fibres in the form of fibre, yarn, fabric or garments [1],[2],[3].

Garment dyeing may be defined as the "application of color to fully fashioned apparel articles, may be in the form of garments cut and sewn either prepared or unprepared knitted fabrics and then dyed, garments and / or components knitted from either prepared or unprepared yarn and then dyed, garments manufactured from either prepared or unprepared woven fabric and then dyed and mixed fabric garments i.e. woven and knitted fabrics manufactured from prepared fabrics and then dyed" [4].

It can be applied for both cotton knit/woven goods and many other fabrics are made of wool, nylon, silk, polyester etc [5].

Why garments dyeing? [6]

- Producing desired effects on garments according to buyer requirements.
- Quick response and improved inventory control.
- Quick response to fashion change, lead times have been reduced to 4 to 5 days from 2 to 3 weeks.
- Earning maximum revenue.

The entire garment dyeing activities may be broken down in to four categories [7]

- Fashioned garment dyeing
- Cut and sewn garment covering woven and knitted fabrics.
- Dyeing of 100% cotton goods for boutique trade suitable for hand washing
- Washing, desizing, bleaching denim goods, leading to stone wash, snow wash, over dyeing and highlighting effects.

In order to dye in garment form, we need to design the garment keeping the purpose in mind and also we need a lot of considerations in choosing the accessories, fabric structure and colorants [8].

Present situation in Bangladesh:

- ❖ Huge Influx of garment dyeing Order from Europe and America
- ❖ Not so much skilled technician in the industry
- ❖ Dominated by foreigners
- ❖ Technicians in the industry don't like to adopt new process.
- ❖ Washing plant with garment dyeing facility is increasing

Greige or PFD (prepared for dye) are two state of cotton garments to the garments dyeing plant. If it is PFD, simple washing treatment needed to remove the dust and other additives. If it is in grey form it requires the full treatment process like scouring, bleaching etc [9].

There are various trend of garments dyeing like Dip dyeing, batik, tie dyeing, solid dyeing etc.

In this paper we are giving emphasize on dyeing cotton garments dyed with Direct dye & Pigment.

## II. Material and Methodology

Unlike fabric dyeing machines where rollers and jets are employed in transporting the fabric throughout the machine and liquor, garment dyeing machine require special arrangements to move piece goods / garments through the liquor continuously. Also, care needs to be taken to avoid abrasion marks, stagnation of goods and to reduce tumbling action to reduce the damage to the fabrics.

Types:

1. Horizontal / belly m/c.
2. Vertical / front loader m/c.
3. Dryer (woven, tumble).
4. hydroextractor

Raw materials:

- Dyestuff
- Salt

- Fixing Agent
- Sequestering Agent
- Stabilizer
- Peroxide
- Caustic soda
- Detergent
- Soda ash

### Process of Garments Dyeing:

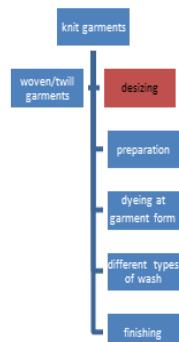


Figure 1. Garments Processing for Dyeing

#### Recipe for preparatory washing for PFD:

Detergent-3 g/l  
Soda ash-3 g/l for 10 minutes at 80 °C

#### Recipe of pretreatment for Greige garments: (Figure 3)

Detergent-1g/l  
Wetting agent-1g/l  
Sequestering agent-1g/l  
 $H_2O_2$ -2/3 g/l  
Caustic soda-1/2 g/l  
 $H_2O_2$  stabilizer-0.3 g/l

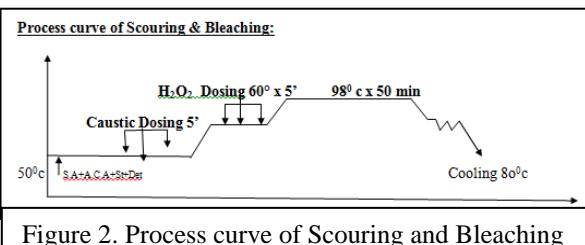


Figure 2. Process curve of Scouring and Bleaching

#### Dyeing Procedure with Direct Dye: (Figure 3)

- Set the dye bath with substrate at room temperature.
- Add dye solution with others auxiliaries, 20% salt and raise the temperature at 95°C.
- Run the bath for 15-20 minutes and add rest 80% salt step by step.
- Run the bath for 20-30 minutes at 90°-95°C for complete the dyeing.
- Cool down the bath temperature to 60°-70°C.
- Drop the bath and fixing to be done at 55°C for 5 min.
- Next detergent wash at 80°C for 5 min.

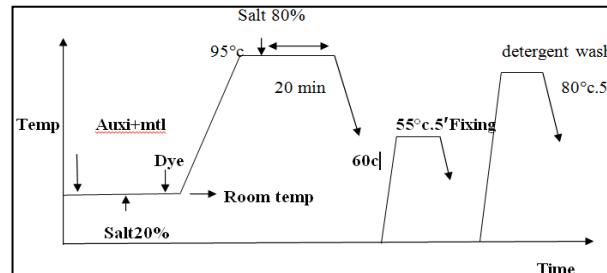


Figure 3. Dyeing Curve for Direct Dye

#### Recipe for Direct dye:

For detergent wash:  
Multi-function chemical-1 g/l  
Caustic soda-5 g/l  
Hydrogen peroxide- 5 g/l  
Acetic acid (for neutralization)-1 g/l

Recipe for dyeing:  
Direct dye-2.5%  
Glauber's salt-28 g/l  
Sequestering agent-1 g/l

Recipe for fixing:  
Fixing agent (Optifix AC)-2 g/l  
Acetic acid-1 g/l  
Cationization Typical Recipe:  
Cationizing agent-3g/l  
Acetic acid-0.5g/l

#### Procedure for Dyeing with Pigment : (Figure 4)

##### Cationizing:

- Set the bath with substrate at room temperature and add cationizing agent.
- Run the bath for 5-10 minutes and add acetic acid to maintain slightly acidic pH
- Run the bath for 20 minutes at 40°C.
- Drop the bath rinse the twice with warm and cold water successively.

##### Recipe:

Cationizing agent-3g/l  
Acetic acid-0.5g/l

##### Pigment dyeing.

Add pigment (5% owf) to the bath. Increase temp to max 80 °C and run for 30 mins. Solubilize pigment with hot water before adding to the bath. after dyeing bath drop (BD).

##### Fixing:

For fixing the pigment with fiber the substrate is treated with the following-

Fixing agent-2 g/l

Temp.- 55/50° c

run for 15 mins and then bath drop.

Then rinse to wash out the loosely attached pigments and other unexpected chemicals.

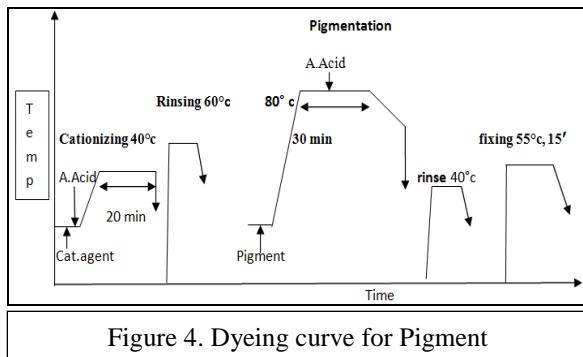


Figure 4. Dyeing curve for Pigment

### III. Results and Tables

- At garment dyeing direct dyes is used for producing seamline effect/pukering effect. (Figure 5)

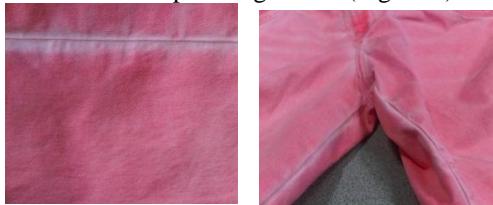


Figure 5. Garments dyed with Direct Dyes

- Pigments used for bright looking on seam line & whole body (Figure 6)



Figure 6. Garments dyed with Pigments

- The garment dyed samples give uneven but designable effect.(Figure 7)



Figure 7. Difference in seam line effect (1-fabric dyed,2-garment dyed)

Table 1. Fastness properties

Dye	Light fastness	Wash fastness	Rubbing fastness		Perspiration fastness	
			Dry	Wet	Acid	Alkali
Direct dye	4-5	3-4	4	3	4	4
Pigment	6-7	4-5	3-4	3	3.5-4.5	3.5-4.5

### IV. Conclusion

Traditionally, garments are constructed from fabrics that are pre-dyed before the actual cutting and sewing. Its advantage is the cost effectiveness of mass producing identical garments of particular colors. A major drawback with this approach is the risk associated with carrying a large inventory of a particular style or color.

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